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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/853,962	05/10/2001	Peter Hey	004582	6593

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APPLIED MATERIALS, INC.  
2881 SCOTT BLVD. M/S 2061  
SANTA CLARA, CA 95050

EXAMINER

KOPPIKAR, VIVEK D

ART UNIT	PAPER NUMBER
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1775

DATE MAILED: 02/24/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/853,962

Applicant(s)

HEY ET AL.

Examiner

Vivek D Koppikar

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 20 January 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 22-38 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 22-38 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 May 2001 is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
- a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

### Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- ☐ Interview Summary (PTO-413) Paper No(s) \_\_\_\_\_
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other:

**FINAL OFFICE ACTION**

***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

2. Claims 22-23, 25-30, 33-35 and 37-38 are rejected under 35 U.S.C. 102(a) as being anticipated by WO 99/47731 to Chen.

The examiner takes the position that "high aspect ratio" refers to an aspect ratio of greater than 4:1 and specifically greater than 10:1 as recited in the instant specification (Section [0004]).

Chen is directed towards a method for electrolytically depositing copper on a semiconductor workpiece.

With regard to Claims 22-23, 25-26, 28-29, 33-35 and 37-38 Chen teaches a method of positioning a substrate covered with a conductive barrier layer (10) (TiN) (Figure 2c and Page 12, Ln. 15-19) in an electrochemical bath. A second conductive material (15) (a copper layer) is plated onto the barrier layer in an electrochemical bath with the aide of a plating bias (Page 20, Ln. 1-9). Next a further processing step deposits a further amount of copper (18) on the layer (15) (Page 14, Ln. 13-20). This copper layer (patching layer), which is electrochemically deposited and formed in situ (Figure 3)), fills the trenches and vias in the semiconductor workpiece (Abstract). The current density used during the electroplating step is between around 1 milliamps\*min/cm<sup>2</sup> or 60 mA\*sec/ cm<sup>2</sup> (Page 18, Ln. 4-9). Providing the copper layers through electrochemical techniques reduces the voids and non-continuous regions (Page 14, Ln. 2-15).

With regard to Claims 27 and 30, the electrochemical deposition technique used periodic pulses (Page 18, Ln. 8-9).

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 22, 24, 29, 31-32, 35-36 are rejected under 35 U.S.C. 102(e) as being anticipated by US Patent Number 6,423,636 to Dordi.

Dordi is directed towards a process for improving seed layer productivity for a copper metalization process on a semiconductor wafer.

With regard to Claims 22, 29, and 35, Dordi teaches a method of positioning a substrate in a processing chamber. A full coverage barrier layer is deposited on a substrate, next a seed layer (patching layer) is electrochemically deposited on a substrate by the use of an electrochemical bath and a plating bias. During this process the substrate is immersed into the electroplating bath. Next the substrate is transferred into an electrochemical deposition cell (in situ) to form a metal layer and the interconnect features (e.g. vias, trenches, etc.) are filled with copper (Figure 3; Col. 3, Ln. 13-21; Col. 4, Ln. 64-Col. 5, Ln. 35; Col. 7, Ln. 3-54; and Col. 9, Ln. 15-47). All three the layers are conductive since they are made of copper (Col. 7, Ln. 15-21). The current density used in the plating process is between 10 to 80 mA\*sec/cm<sup>2</sup> (Col. 9, Ln. 32-37).

With regard to Claim 24, the thickness of the seed layer in Dordi in one embodiment is between 150 to 300 angstroms (Col. 7, Ln. 46-48).

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With regard to Claim 31-32 and 36, the bias is applied to the substrate for a time period of 1 to 20 seconds and the resulting wattage is between 1000 W and 5000 W. The current is between 10 to 80 amperes. Since the voltage used is calculated by the watts divided by the current, the voltage is in the range of 12 volts to 500 volts (Col. 7, Ln. 22-55; Col. 9, Ln. 15-47 and Col. 11, Ln. 21-6

### ***Double Patenting***

5. A rejection based on double patenting of the "same invention" type finds its support in the language of 35 U.S.C. 101 which states that "whoever invents or discovers any new and useful process ... may obtain a patent therefor ..." (Emphasis added). Thus, the term "same invention," in this context, means an invention drawn to identical subject matter. See *Miller v. Eagle Mfg. Co.*, 151 U.S. 186 (1894); *In re Ockert*, 245 F.2d 467, 114 USPQ 330 (CCPA 1957); and *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970).

A statutory type (35 U.S.C. 101) double patenting rejection can be overcome by canceling or amending the conflicting claims so they are no longer coextensive in scope. The filing of a terminal disclaimer cannot overcome a double patenting rejection based upon 35 U.S.C. 101.

6. Claims 11-12 and 16-17 are provisionally rejected under 35 U.S.C. 101 as claiming the same invention as that of claims 59, 67, 93 and 97 of copending Application No. 09/614407. This is a provisional double patenting rejection since the conflicting claims have not in fact been patented.

7. Claim 13 is provisionally rejected under 35 U.S.C. 101 as claiming the same invention as that of claims 69-71 of copending Application No. 09/614407. This is a provisional double patenting rejection since the conflicting claims have not in fact been patented.

8. Claim 14 is provisionally rejected under 35 U.S.C. 101 as claiming the same invention as that of claims 72-73 and 76-77 of copending Application No. 09/614407. This is a provisional double patenting rejection since the conflicting claims have not in fact been patented.0).

*Response to Arguments*

9. The 35 USC 112 rejection over claims 11-21, set forth in the office action dated September 30, 2003, has been overcome. The amendment filed on January 20, 2004 has overcome this rejection.

10. Applicants' arguments filed on January 20, 2004 over the 35 USC 102 rejections have been fully considered but they are not persuasive.

Claims 1-21 have been cancelled and Claims 22-38 have been added to the application. The scope of these newly added claims is similar to the original claims.

Although the applicants have attempted to argue against the 35 USC 102 rejections set forth in the office action dated September 30, 2003, the applicants have simply listed the names of the prior art references used in these rejections and have said that they do not teach or suggest all the limitations of the claims. However, in order to overcome these prior art rejections the applicants must clearly show the differences between the instant invention and the prior art references used in the 35 USC 102 rejections.

11. The examiner acknowledges the applicants' arguments filed on January 20, 2004 over the 35 USC 101 double patenting rejections set forth in the office action dated September 30, 2003 and appreciates the intent of the applicants to file a terminal disclaimer over these claims, however this is not seen to overcome the rejection which is maintained and is final.

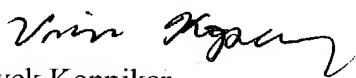
*Conclusion*

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Vivek Koppikar** whose telephone number is (703) 305-6618. The examiner can normally be reached on Monday-Friday from 8 AM to 5 PM, Eastern Time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Deborah Jones, can be reached at (571) 272-1535. The fax phone number for the organization where this application or proceeding is (571) 273-1537.

  
Vivek Koppikar

2/9/04

  
DEBORAH JONES  
SUPERVISOR EXAMINER